Comments on Notice of Proposed Rulemaking, WT Docket No. 16-239, Proceeding RM-1170816-239; Amendment of Part 97 of the Commission's Amateur Radio Service Rules to Permit Greater Flexibility in Digital Data Communications

I am amateur extra class radio operator KR4K, hold FCC commercial radiotelegraph license T2GB027725, and am a licensed Professional Engineer (PE - Electrical) in AL, AZ, CA, NV, TX, and VA. I have 40 years of communications engineering experience, and I have authored nineteen HF-communications engineering related articles, conference papers, and technical reports as listed at: https://www.researchgate.net/profile/Gus_Lott/publications

I support the proposed rule change as summarized by the FCC - eliminating the current baud rate limitations and not adding a bandwidth limitation for data emissions in the MF and HF bands.

This change promotes amateur contributions under §97.1 (b) and (c), and the proposed rule change will assist the amateur radio community in providing emergency communications under §97.1(a).

I concur with the FCC's conclusion that any bandwidth limitation will "…undermine the goal—fundamental to the amateur service—of encouraging advances in technology if amateur radio operators were thereby prevented from stepping beyond today's radio science." I agree that current §97.307 and §97.309 rules are adequate to maintain efficient and orderly spectrum use.

The FCC proposed rule change will encourage amateurs to improve the state of the art and practice under §97.1(b) and (c), enabling amateur use of technologies such as:

- waveforms specified in MIL-STD 188-110C, STANAG 4539, and STANAG 4203, including 110C Appendix D, "HF Data Modem Waveforms For Single Contiguous Bandwidths Up To 24 kHz" and as described in W. N. Furman and J. W. Nieto, "Latest on-air testing of U.S. MIL-STD-188-110C appendix D wideband HF data waveforms," *Ionospheric Radio Systems and Techniques (IRST 2012), 12th IET International Conference on*, York, 2012, pp. 1-5;
- multi-channel wavelet (fractal) packet and similar modulation methods that offer improved HF channel performance in the presence of Doppler spread and shift, similar to that as described in US Patent 7206359, "System and method for orthogonally multiplexed signal transmission and reception" and as in E. Kjeldsen, J. C. Dill and A. R. Lindsey, "Exploiting the synergies of circular simplex turbo block coding and wavelet packet modulation," *Military Communications Conference, 2003. MILCOM '03. 2003 IEEE*, 2003, pp. 1202-1207 Vol.2;
- using existing modulation formats to simultaneously modulate up to 16 carriers in noncontiguous 3 kHz channels as proposed in E. Koski, J. Nieto, M. Thompson and J. Russell, "RF Performance Implications of Wideband HF Waveforms," *2014 IEEE Military Communications Conference*, Baltimore, MD, 2014, pp. 1491-1497;
- many-in, many-out (MIMO) HF radio techniques, similar to that described in S. Salous, S. M. Feeney, E. M. Warrington, S. D. Gunashekar and N. M. Abbasi, "Experimental investigations of MIMO in the HF band," *Ionospheric Radio*

Systems and Techniques (IRST 2012), 12th IET International Conference on, York, 2012, pp. 1-4, and in P. M. Ndao, Y. M. Erhel, D. Lemur, M. Oger and J. Le Masson, "First experiments of a HF MIMO system with polarization diversity," *Ionospheric Radio Systems and Techniques (IRST 2012), 12th IET International Conference on*, York, 2012, pp. 1-5;

- 3rd and 4th generation Automatic Link Establishment (ALE) techniques as described in MIL-STD 188-141C and in W. N. Furman, E. Koski and J. W. Nieto, "Design concepts for a wideband HF ale capability," *Ionospheric Radio Systems and Techniques (IRST 2012), 12th IET International Conference on*, York, 2012, pp. 1-5; and
- cognitive radio applications that minimize interference to other amateur operations using frequency, time, and spatial awareness as described in A. K. Shukla, N. K. Jackson-Booth and P. C. Arthur, "“Cognitive radios” and their relevance to HF radio systems," *Ionospheric Radio Systems and Techniques (IRST 2012), 12th IET International Conference on*, York, 2012, pp. 1-6 and in L. Melián-Gutiérrez, S. Zazo, J. L. Blanco-Murillo, I. Pérez-Álvarez, A. García-Rodríguez and B. Pérez-Díaz, "Efficiency improvement of HF communications using cognitive radio principles," *Ionospheric Radio Systems and Techniques (IRST 2012), 12th IET International Conference on*, York, 2012, pp. 1-5.

Development and adoption of these technology types have the potential to mitigate many of the previous interference and spectrum crowding objections submitted under RM-11708.

The proposed rule change will also allow operation using PACTOR 4 and future PACTOR-related waveforms. Changing the current rule supports my operations under §97.1 (a) by allowing faster and more reliable message delivery during emergencies.

I therefore respectfully request the Commission **adopt the proposed rule** using the FCC suggested language. I further request that the Commission expeditiously adopt this rule change because of the tremendous benefits it offers to the amateur community.

Sincerely,

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